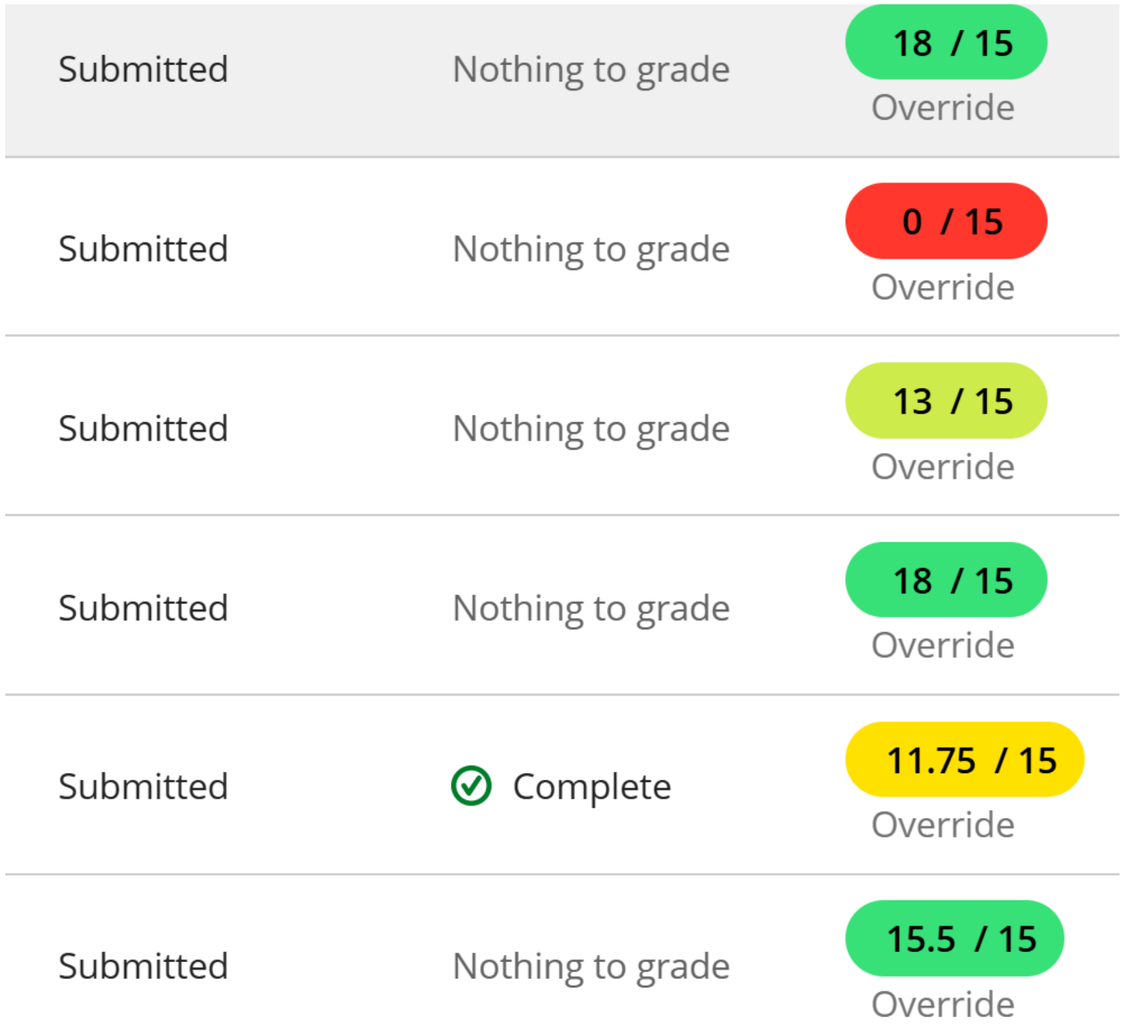
Geography
College of Arts and Sciences
UNIVERSITY OF SOUTH CAROLINA

Week 6 lab: Surface Hydrology and Watershed Processes

GEOG 201, 2024 Fall



The week 5 Quiz..

We gave everyone three extra points because the overall grade was not good, and many students did not open it.

I give you one more chance to redo it. If you would like to redo the week 5 lab quiz, please email me.

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Surface Hydrology

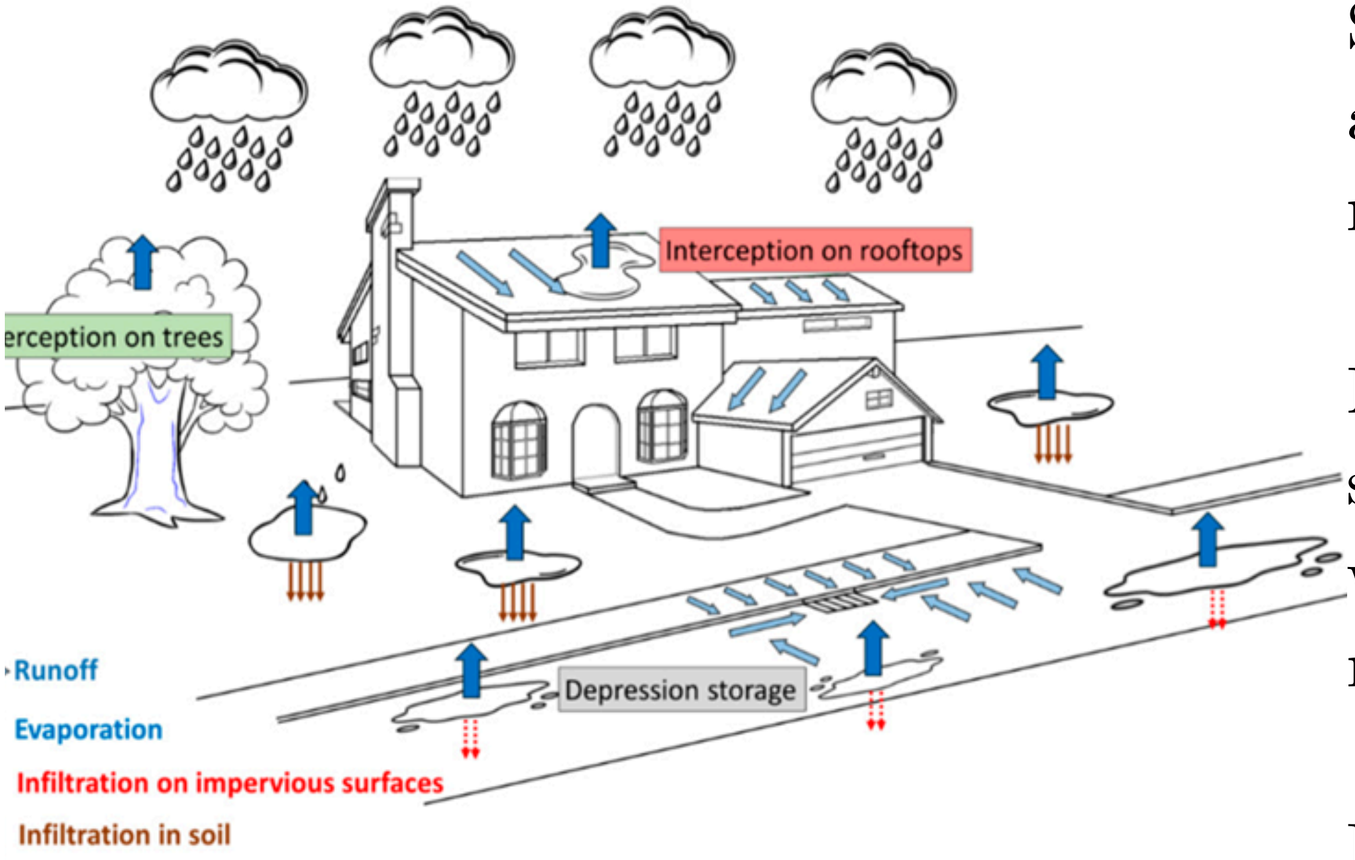
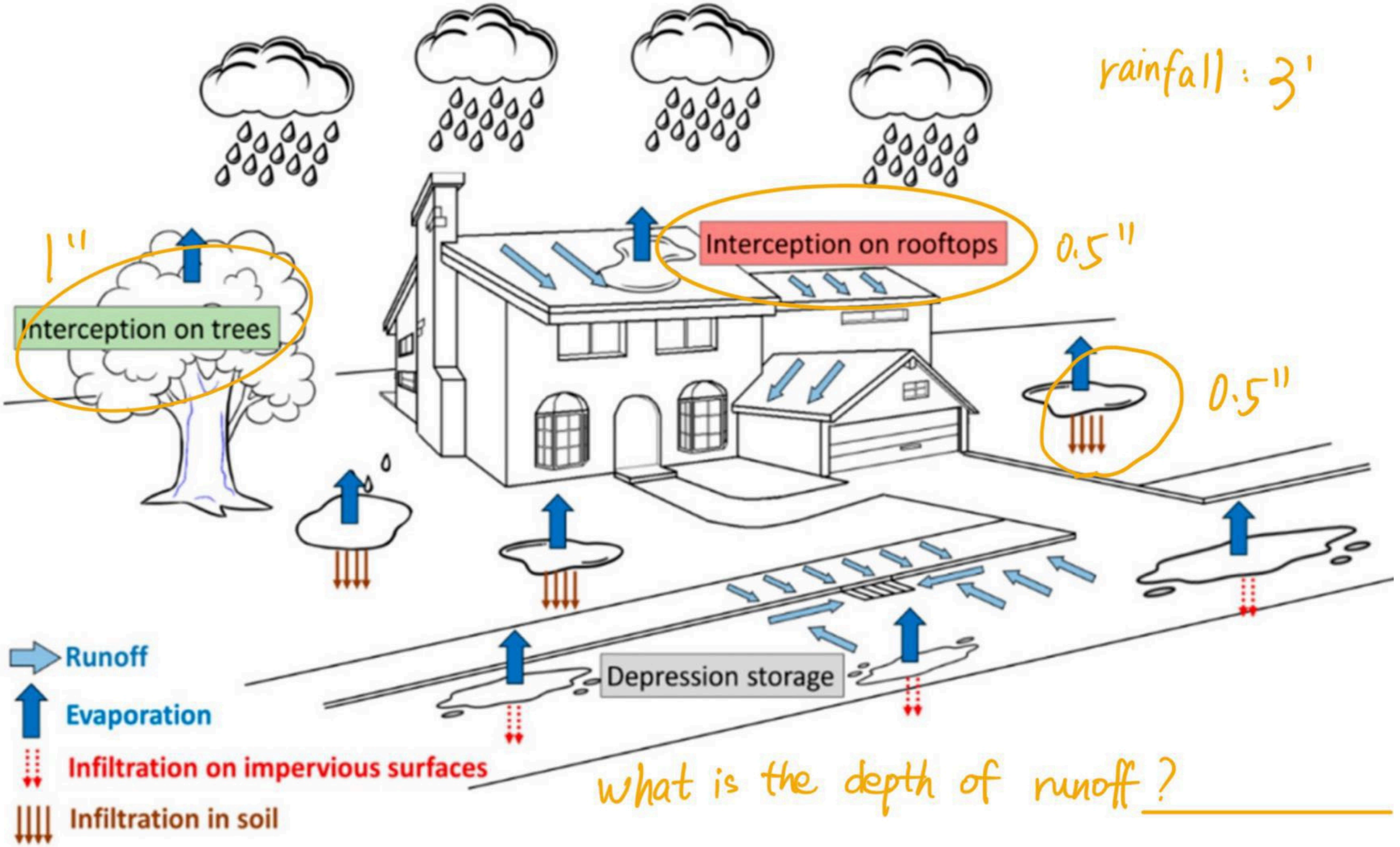


Figure 1. Diagram of physical processes governing runoff production. (https://doi.org/10.3390/w12102777)

Some is intercepted by vegetation, buildings, and other features, evaporating before ever reaching the surface.

Next, of the water that does reach the surface, some seeps into the soil (Infiltration) while some flows relatively rapidly over or near the surface (Runoff).

In other words, runoff is the amount of incoming precipitation minus the amount that infiltrates into the soil.


rainfall : 3'
1"
Interception on trees
Interception on rooftops
0.5"
0.5"
Depression storage
Runoff
Evaporation
Infiltration on impervious surfaces
Infiltration in soil
what is the depth of runoff ?

Lab Activity 1

Q2. A storm delivers 2” of rainfall, of which 0.25” is intercepted by trees and other vegetation and evaporates before ever reaching the ground. Of the remaining water, 1” seeps into the soil.

- What is the depth of runoff that should result from this storm?

_____inches

- Soil texture has an important impact on infiltration, and therefore, runoff. If Farm X has clay-rich soils and Farm Y has sandy soils, which farm (**X** or **Y**) is likely to have the greatest surface runoff in response to a given rainfall event? Why?

Farm _____

Briefly explain your answer:

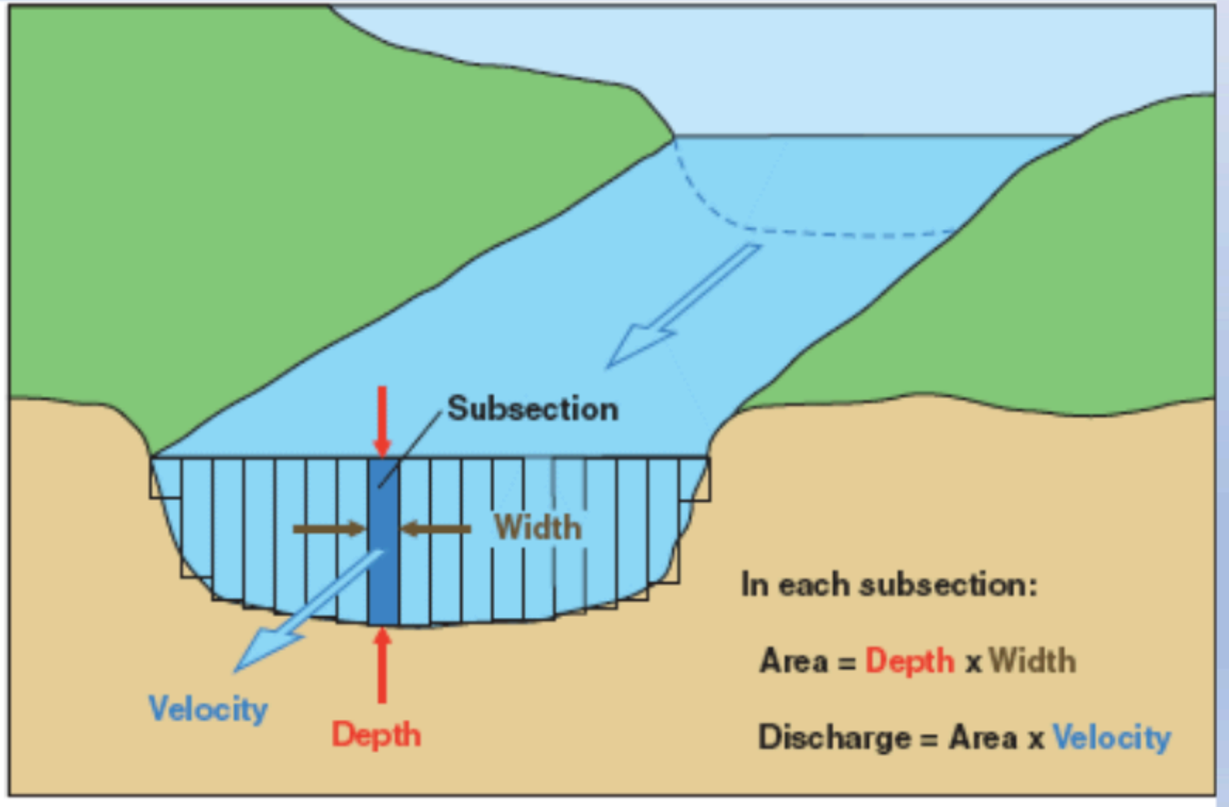
A storm drops 4" of rainfall on the USC campus, of which 0.5" is intercepted by vegetation and evaporates before ever reaching the ground. Of the remaining water, 0.5" infiltrates into the soil.

What is the total depth ofsurface runoff that you would expect?

Q = A * V

(Discharge) = Area * Average velocity

(A = width x avg. depth)



$$Q = A \times V$$

where:

- A is the cross-sectional area of the river (width × depth).
- V is the average flow velocity.

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Table 1. Cross-section Data

Station #	Station Position (m)	Width (m)	Depth (m)
1	0	0	0
2	2	2	1
3	4	2	2
4	6	2	3.5
5	8	2	5
6	10	2	4.5
7	12	2	4
8	14	2	2.5
9	16	2	1.5
10	18	2	0.5
11	20	2	0

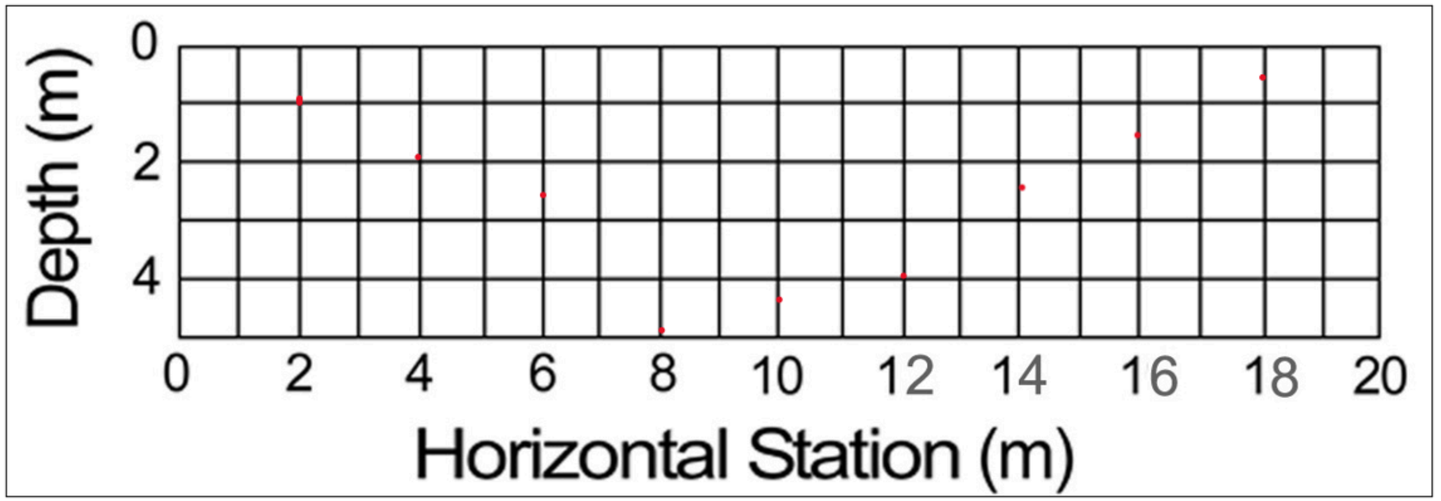

Figure 7. Cross-section of Kupfer Creek

River Stage: Height of the water in the channel

River stage refers to the height of the water surface above a reference point, such as the riverbed or a specific gauge datum. It is a key measurement used to assess the potential for flooding, as higher stages can indicate the river's approach to or exceedance of its bankfull capacity.

A stage-discharge relationship, or rating curve, is often developed by plotting river stage against measured discharge values over time. This curve allows for quick estimation of discharge based on observed river stage, which is particularly useful for flood forecasting and management.

Page 9, Fig 10

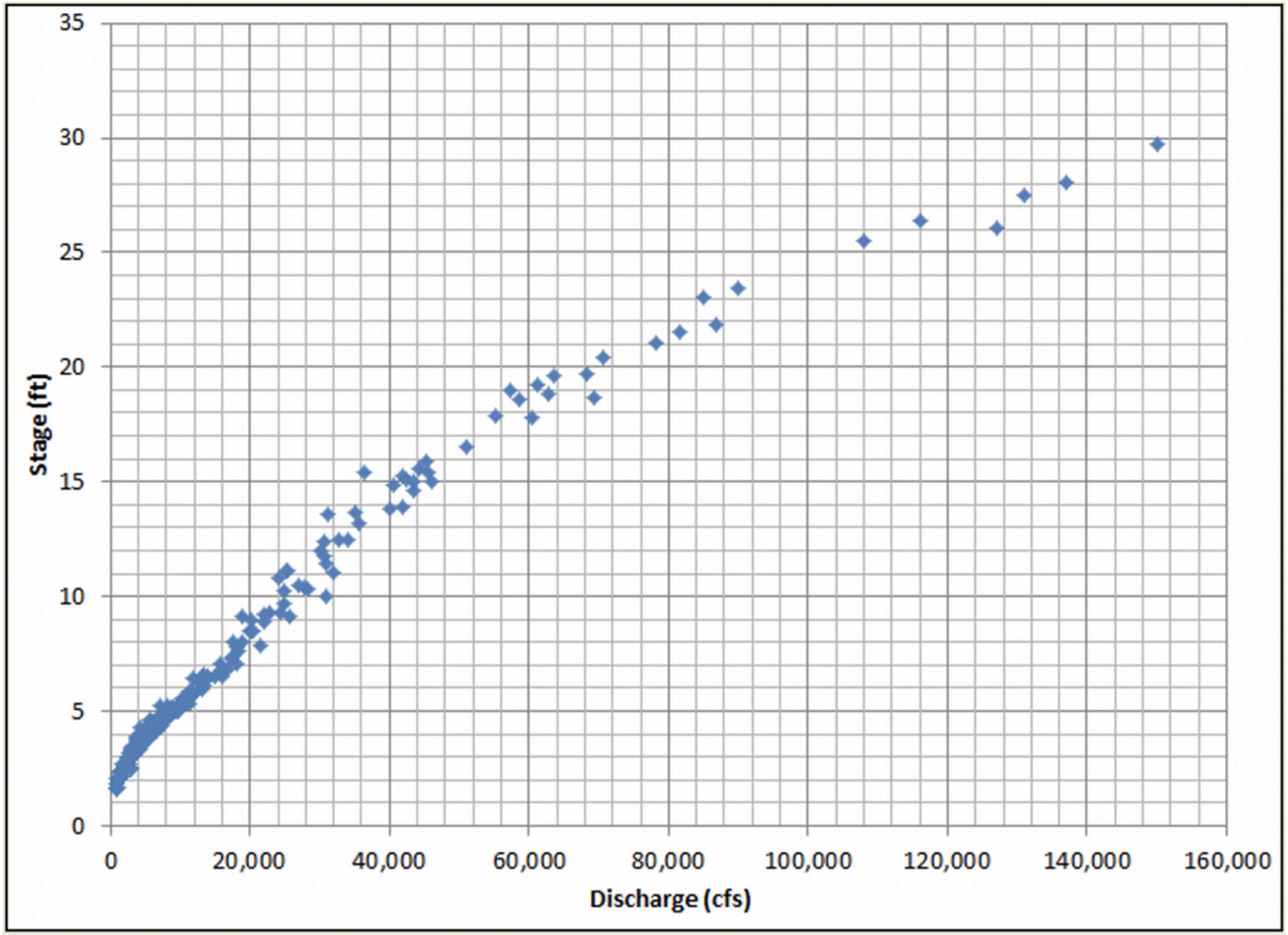

Figure 10. Stage-discharge rating curve for the Congaree River, Columbia, SC.

Q12: Create a rating curve by sketching in a 'best fit' line through the data points. Y*ou can, for example, use the drawing tools in MS Word to accomplish this.*